

WQC Designed to Protect Human Health

Humans can be exposed to contaminants via:

1. Drinking water (in public water supplies)
2. Ingestion of contaminated fish (in all waters)

These human health WQC are designed to prevent fish contamination beyond a certain level.

Human Health WQC are
Calculated by Determining an
Acceptable Concentration of Fish
Tissue, then Converting this into a
Water Column Concentration
Using a Bioconcentration Factor

Factors Involved in Calculations

- General values:
 - Average body weight
 - Average fish ingestion rate
 - Average water consumption rate (water supplies only)
 - Extra cancer risk (for carcinogens only) (1 in 100,000)
- Contaminant Specific Values:
- Toxicity Value
 - Carcinogen : oral slope factor ($q1^*$)
 - Noncarcinogen: reference dose (RfD)
 - Bioconcentration factor (BCF) for converting fish concentration into a water concentration

Equations for Human Health Protection (carcinogen)

WQC:

$$\frac{10^{-5} \quad X \quad 70 \text{ kg}}{Q1^*(.0175 \text{ kg. fish/day} \times BCF)}$$

Equivalent Fish Concentration:

$$\frac{10^{-5} \quad X \quad 70 \text{ kg}}{Q1^* \times 0.0175 \text{ kg. fish/day}}$$

All Values Used in Calculation of WQC and Fish Concentration are Recommended by EPA

- Q1* from IRIS database
- Body weight and fish consumption rate are from EPA's most recent guidance
- Virginia has selected 1 in 100,000 as a n acceptable extra cancer risk (1 in 1 million is other option)
- Virginia has not used a 20% relative source contribution for PCBs

EPA's Risk Recommendations for PCBs

- EPA notes that “bioaccumulated PCBs appear to be more toxic than commercial PCBs and appear to be more persistent in the body”.
- “For exposure through the food chain, risks can be higher than those estimated in this assessment”.
- Exposure to PCBs via the food chain represent the high risk and persistence

EPA Expects States to use their Recommended Exposure Values

- Any deviation from EPA's recommendations must be supported by extensive scientific evidence that a different value is more appropriate for a State and is at least as protective as EPA's recommended criterion.
- States rarely deviate from EPA's recommended values.

Virginia Tech Fish Consumption Survey

(Gibson& McClafferty, 2005)

- Surveys in Elizabeth River & Lower James River
- 52% reported eating two or more meal per month of self-caught fish
- 83% reported eating ≥ 8 ounce meals
- 82 % pan or deep fried fish
- 10.6 % re-use fat or oil from cooking

Criterion is based on EPA recommended BCF of 31,200

- Elizabeth River –Specific BAFs:
- White Perch 16,893
- Spot 23,720
- Bluefish 37,833
- Stripped Bass 70,014
- Croaker 190,919
- Gizzard Shad 1,013,585
- Mean 225,494

*Based on Eliz River fish fillet data